



It pays to own
a fireproof home

Here's How
It's Built *with Concrete*



Here is the oldest concrete home in America. Built in 1852 at Chappaqua, N. Y., by Horace Greeley, it was first used as a barn. Later, when fire destroyed combustible buildings on Mr. Greeley's estate, the barn was permanently transformed into an attractive fireproof home.

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For more than half a century . . .

THE first concrete homes—built more than fifty years ago—pioneered a tradition of strength, permanence, fireproofness and inherent beauty which has defied time and weather. Today, these sturdy homes of concrete are well into their second half century of livability.

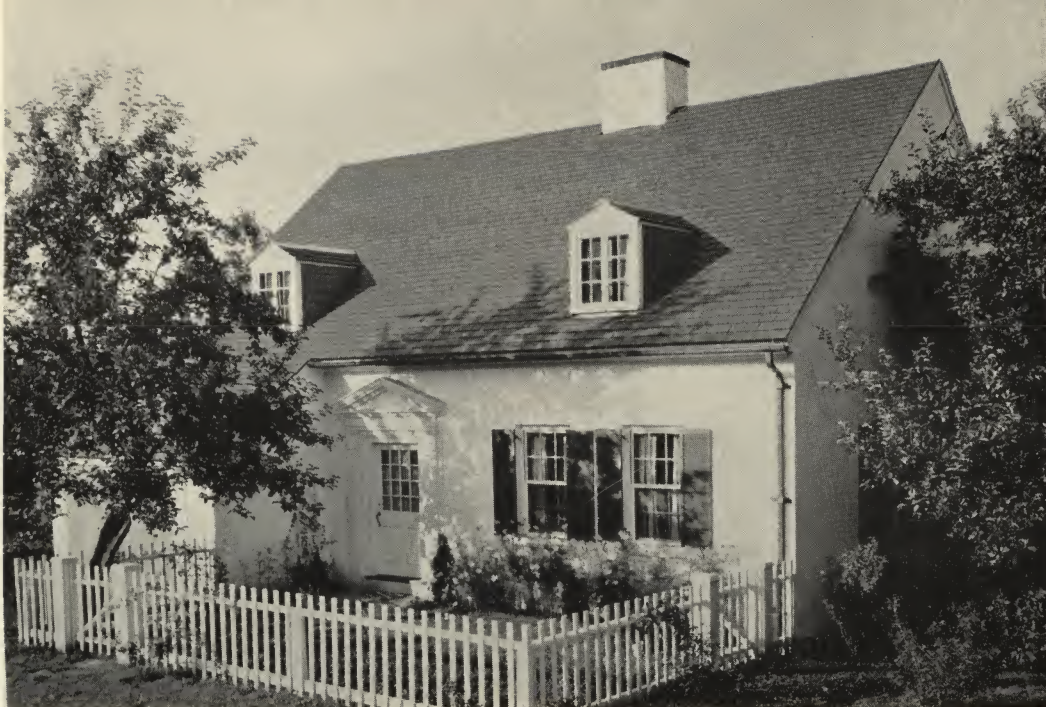
Examples of the earlier homes of concrete—built by those who first learned that *it pays to own a fireproof home*—are pictured on this page. The oldest concrete home

in America is shown above. This was erected in 1852 by Horace Greeley. At the bottom of the page another old house—built in 1872—is illustrated.

These houses—and others not pictured here—are monumental proof of the prophecies of their builders that it would pay to own a fireproof home of concrete. This important tradition is handed down to the present generation. And this booklet tells how today's fireproof homes are built.

W. E. Ward, a mechanical engineer, built this all-concrete home at Port Chester, N. Y., in 1872. It has walls, floors, partitions and roof of fireproof concrete. After 62 years, this home is still considered as a fine residence in which home life is enjoyed to the utmost.





Concrete Homes Styled for Today

IN the modern concrete home the traditional advantages—fireproofness, permanence, strength and lasting beauty—are retained. But there is more in the concrete home of today, for there is wider variety in form, color and texture.

An attractive small home is pictured above. Study it. It's a concrete home styled for today. Designed by Charles M. Willis, architect, this house has walls of concrete masonry painted white. Another

type of modern home—that which has a flat roof—is shown below. Designed by Amos B. Emery, architect, this house has walls of concrete masonry painted white, concrete floors and concrete roof.

These are but two of the many possibilities, for the concrete home of today may be of any design or any color one chooses. Turn to the next page for proof of the fact that *it pays* to own a fireproof home, and learn how it's built with concrete.



It pays to own a fireproof home . . .

Here's How It's Built with Concrete

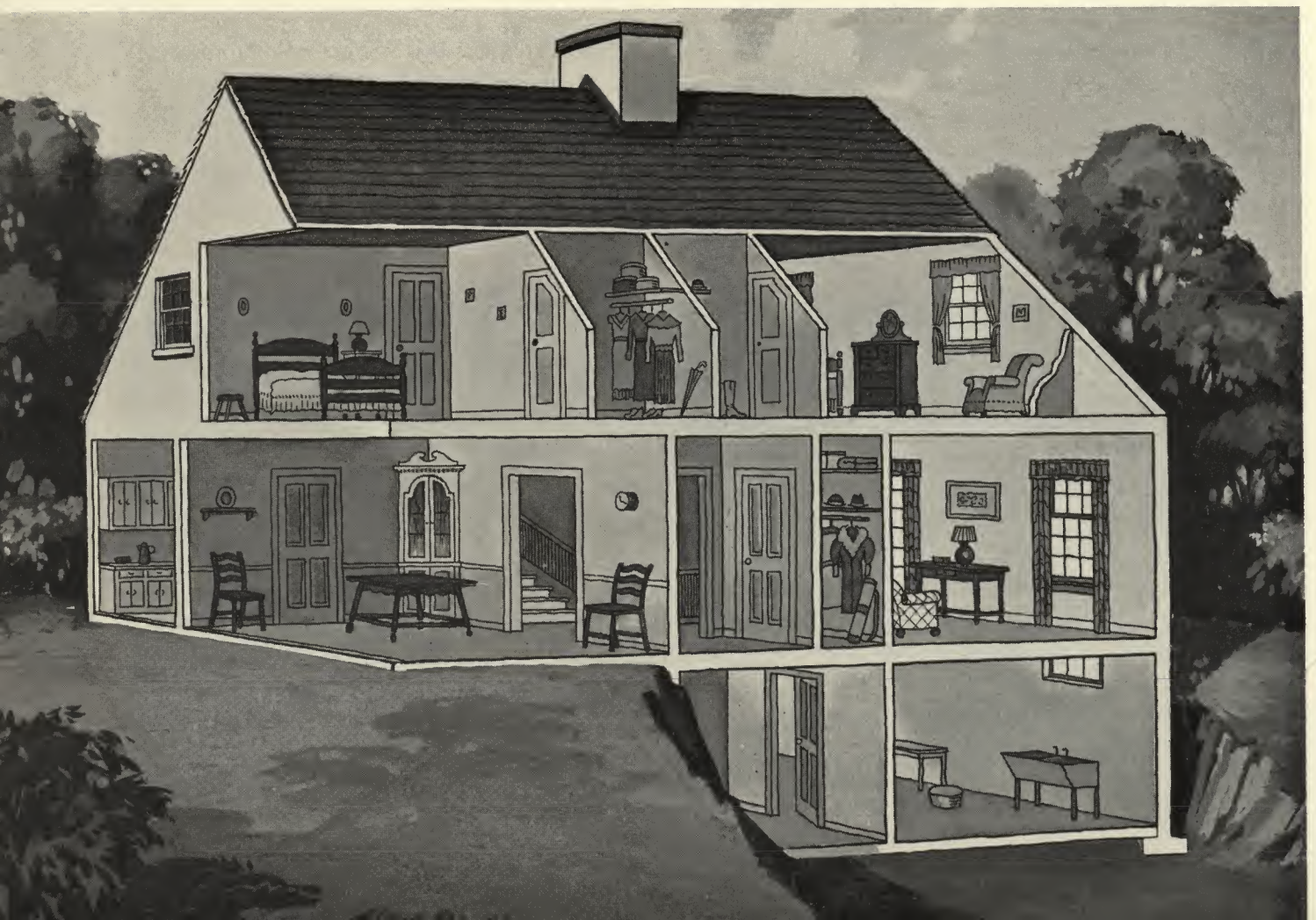
EVERY prospective purchaser or builder of a new home profits by being able to visualize the various construction operations as the home grows from footings to top of the roof. "Seeing is believing," someone said, and so it is with home construction.

Each of the different structural elements of the fireproof concrete home has its own part to perform and will deliver its best only when properly built. It is better, safer to know how a home is built than to take the construction for granted. Knowing, you prove to yourself that it pays to own a fireproof home.

There are several ways in which fireproof concrete homes are built. A commonly used method is described herein. Consider, for example, the story-and-a-half concrete ma-



sonry home pictured above and opened up below, and follow its construction—from footings to the roof—on the succeeding pages.



THE important structural elements of the fireproof concrete home—the footing, the basement floor, the foundation, the walls, the first and second floors, and the roof—were seen in the opened-up drawing on page 4.

This home will be fireproof. It will have concrete footings and basement floor; concrete walls and partitions; reinforced concrete floors. The roof will be covered with fireproof concrete materials and fireproofed on the underside with portland cement plaster.

The Footing When construction begins, the contractor first excavates for the basement walls and the footing. For this home, the concrete footing is made 9 inches deep by 18 inches wide.

If the ground is likely to be wet, a line of drain tile is laid around the outside of the footing to provide proper drainage. This is connected to a suitable outlet.

The Basement Wall The contractor next builds the basement wall, using concrete masonry as shown in the upper sketch or solid concrete as shown below. For a one or one-and-a-half story house, the foundation wall is made 8 inches thick; for a two-story, 12 inches. If concrete masonry units are used, it is usual practice to plaster the outside face of the wall with portland cement mortar. This insures complete watertightness, which always is desirable, especially where basements are used for recreation.

The Basement Floor With the footing and foundation walls in place, the contractor builds the basement floor, making the concrete at least 4 inches thick. To give the floor a smooth finish, a ½-inch topping of portland cement mortar may be applied while the under slab is still plastic. Then the topping is troweled lightly.

A space is left between the slab and basement wall and is filled with waterproofing material (asphalt or tar) to provide a watertight joint.

Turn to page 6 for facts about the next step, that of building the first floor.



The First Floor

ACCORDING to chiefs of fire departments and other authorities, the most serious dwelling fires start in basements. But safety against such blazes is built into concrete homes.

The first floor of reinforced concrete, for example, is an effective barrier against the upward spread of basement fires. It is on the job night and day. Too, its greater rigidity ties the exterior walls more securely together.

Three of the more common methods of building fireproof concrete floors for residences are pictured at the left and described below.

Solid Slab Floor Shown in the top sketch is the solid slab floor. This generally is made 4 to 6 inches thick (about 6 inches for the suggested design on page 4), being built with reinforced concrete. It provides a flat ceiling which may be plastered directly or decorated by painting.

Ribbed Joist Floor Structurally, this type is similar to the fireproof construction used in schools, office buildings and similar structures, and is well adapted to home building. Joists and slab are cast at the same time, using metal or wood forms which resemble pans. These are placed in rows, and the space between rows forms a joist. The ribbed floor is shown in center sketch.

Precast Joist Floor This type—a relatively new construction method developed to lower the cost of concrete floors—is especially suitable for home building. The floor consists of factory-made joists of reinforced concrete which support a concrete slab. See bottom sketch.

On the job, as one watches a home growing from footings to top of the roof, the precast concrete joists are spaced 24 to 36 inches apart. These fireproof joists are put in place in much the same manner as wood or steel joists. Then concrete for the slab is placed.

Any of these floors—solid slab, ribbed, or precast joist—makes an excellent base for any type of floor finish the owner may desire.

The Floor Finish

THAT one may choose any type of finish for a reinforced concrete floor is a feature worth remembering. In the home being built, figuratively, in this booklet, wood flooring is shown in the upstairs bedrooms, the hall and the dining room. Linoleum is chosen for the kitchen. Concrete of a rich brown color is selected for the living room.

Variety of Surfaces Of course, one type of floor covering may be used throughout the house, or floor coverings other than those listed above may be used.

Hardwood flooring, as shown in the top photograph, commonly is nailed to wood strips attached to the concrete structural floor. If deemed necessary by the architect, a loose, porous fill of screened dry cinders is placed between the nailing strips.

When a finish of wood flooring is chosen, the concrete structural floor stays on the job night and day, preventing the spread of fires originating in the basement.

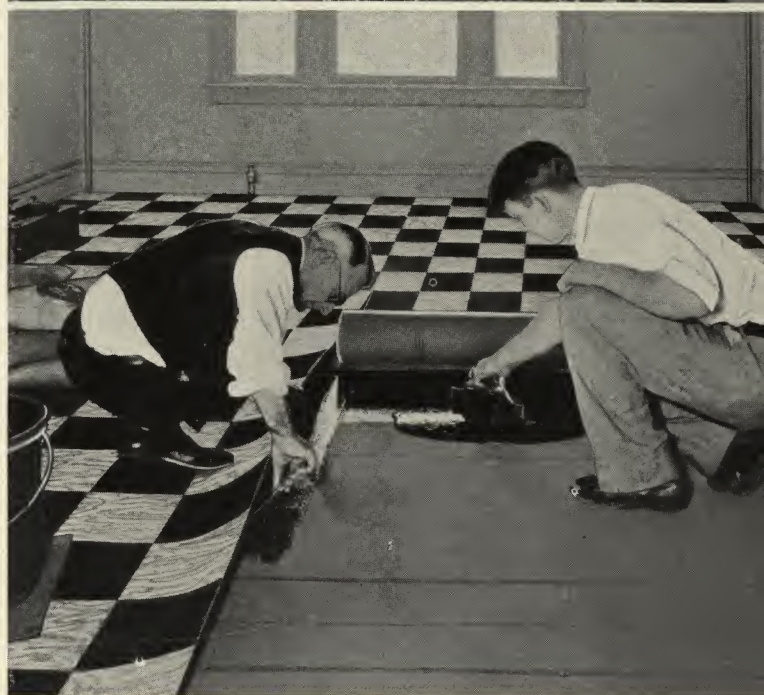
Linoleum or rubber flooring is a popular finish for concrete floors. These are cemented directly to the concrete surface, after it is thoroughly dry, or are cemented to a felt cushion. Either method is satisfactory.

Colored Concrete Because of its attractive and distinctive appearance, the colored concrete floor finish is coming into popular favor. It provides long wear; is easy to keep bright and new.

The colored topping is made from a mixture of portland cement, aggregates (sand, gravel or broken stone), water and mineral color pigments. To get the highest quality of finish, the contractor uses only mineral oxide.

Colored concrete finish may be marked off into patterns, as shown in the bottom photograph, and the surface brought to a high gloss by waxing and polishing. Another method of coloring is to apply chemical stains.

Floor finishes are not built until after walls are completed. Turn to page 8.





The Exterior Walls

HAVING provided sturdy footings of concrete, substantial foundations of concrete masonry or solid concrete, and a fireproof first floor of reinforced concrete, the contractor then starts to build the exterior walls.

Walls may be built with concrete masonry, several types of which are shown at the left; solid concrete; or large concrete slabs. Concrete masonry units are made locally, and laying them up into exterior walls of homes is well understood by bricklayers and masons.

Units for Every Purpose There is a concrete masonry unit for practically every purpose in wall construction. There are special jamb units for use next to window and door frames, header units for bonding together concrete masonry and facing materials such as brick, and several types of units for building fireproof partitions. These specials permit speed in laying.

Sizes of Concrete Masonry One of the commonly used concrete masonry units is shown in the center foreground of the photograph at the top of this page. This is 16 inches long, 8 inches wide and 8 inches high. Placed in a wall, its cores run up and down and form dead air spaces which provide insulation against heat or cold. Another popular type, especially in the Southwest and on the Pacific Coast, is the concrete building tile. This is 12 inches long, 8 inches wide and $3\frac{1}{2}$ or 5 inches high. It is similar to the 8 by 8 by 16-inch unit.

The term *concrete masonry* is applied to block, brick, or tile building units molded from concrete and laid by masons in a wall. The concrete is made by mixing portland cement with water and materials such as sand, pebbles, crushed stone, cinders, slag, burned shale or clay, or other suitable aggregates.

Concrete Masonry on the Job In the center photograph, craftsmen are shown at work laying concrete masonry units into a wall. They are

using a portland cement-lime mortar consisting of 1 part portland cement, 1 part lime and 6 parts mortar sand.

Concrete masonry walls are built quickly by competent workmen and, therefore, are economical. Properly laid concrete masonry walls are true to line and have a clean-cut appearance. The strength of such walls far exceeds the loads they carry in any dwelling house.

Portland Cement Stucco Concrete masonry makes an ideal base for portland cement stucco, which is a popular finish because of its beauty and durability. (Workman applying portland cement mortar to a concrete masonry wall is shown at the bottom of page 8.)

For stucco work, the mortar is made with 1 sack portland cement, 3 cubic feet sand and not more than 15 pounds of hydrated lime.

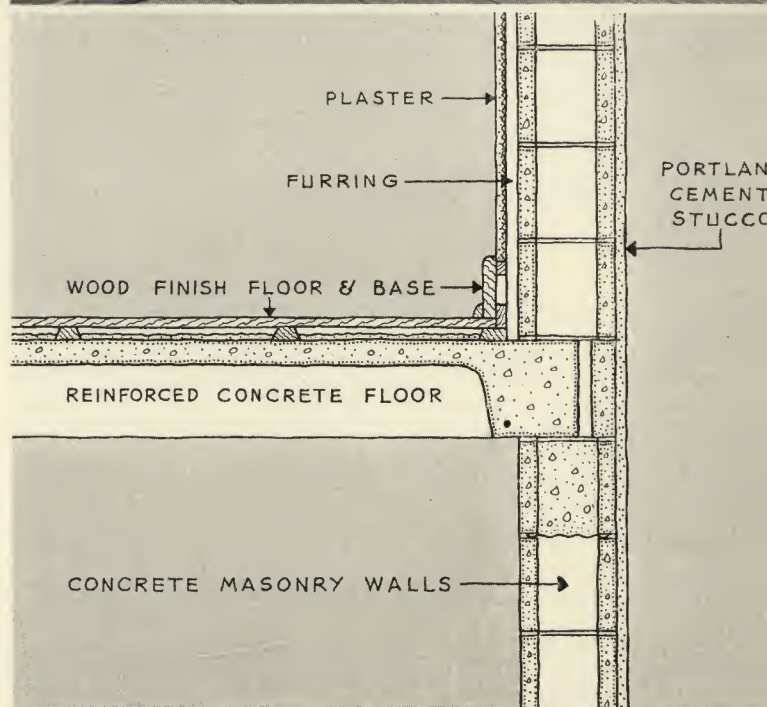
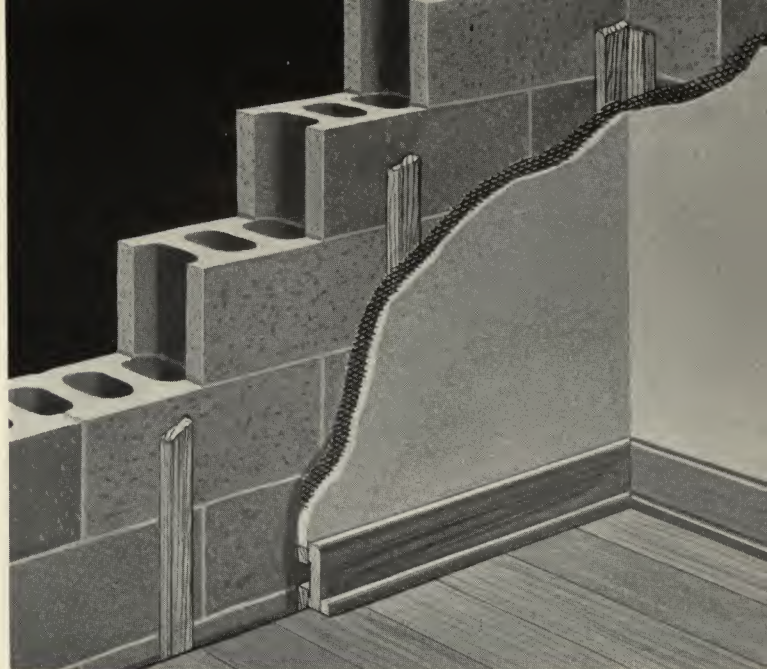
The stucco is applied in three coats. If desired, the final coat may be colored by adding mineral color pigments to the mixture, or by using prepared portland cement stucco.

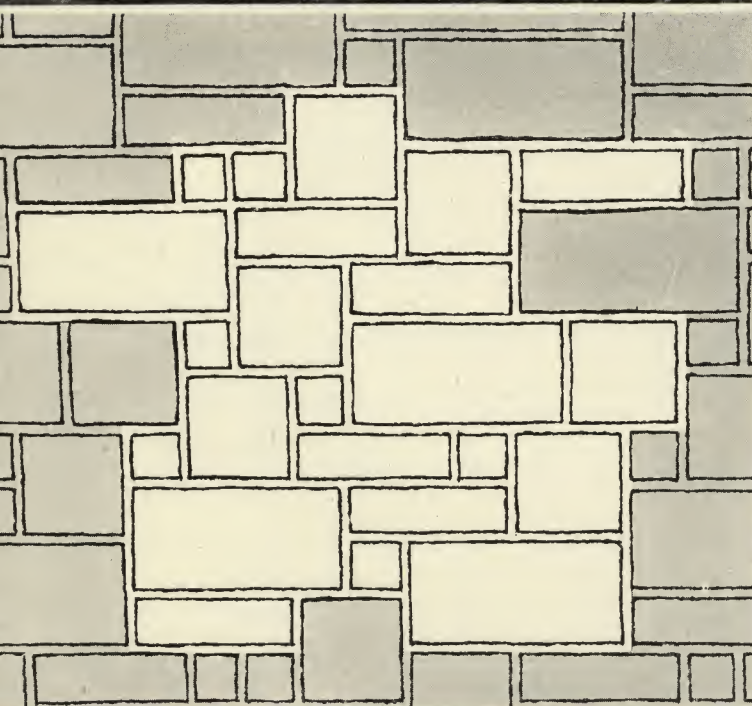
Finish for Inside Walls On the inside, the concrete masonry walls are finished with plaster applied on metal reinforcement which is furred out from the wall with wood strips or self-furring nails. (See sketch at top of this page.) Nails may be driven into some types of concrete masonry.

Concrete furring tile or rigid insulating board may be substituted for the metal reinforcement as a base for plaster, or may be used in place of plaster as a wall finish.

Details of Construction The sketch in the center of this page illustrates construction of a fireproof concrete home at the first floor level. The footings, basement walls, basement floor, first floor and exterior walls are now completed.

Sills and lintels for the windows in both first and second stories of this house are of concrete. (See sketch at bottom of this page.) Each lintel, which supports that part of the wall which is directly above a window or a door, is reinforced with steel bars. Turn to page 10.





Concrete Ashlar Walls

ILLUSTRATIONS on this page show an alternate method of building walls for the fireproof concrete home. For example, one may prefer to finish the exterior by using white or colored portland cement paint.

Painted or untreated concrete masonry, which is known as *concrete ashlar*, is becoming popular in many sections because of its distinctive appearance and economy. The concrete units may be of different sizes and laid according to an irregular or random pattern, or units of one size may be used.

An Architect's Home At the top of this page is a close-up photograph showing the concrete walls of the residence of Clarence E. Day, architect. These walls are random concrete ashlar painted white. The paint does not obscure the mortar joints, so the masonry effect is retained.

Concrete Ashlar Patterns One of the more popular concrete ashlar patterns is shown in the center sketch. Four sizes of concrete masonry units are used, and the pattern is repeated for every square yard of wall area. However, once the wall is built, the units form an authentic random surface. The pattern stands out in this sketch because the artist has shaded only that portion of the wall which surrounds the pattern.

Concrete ashlar, as shown in the photograph at the bottom of this page, also makes an extremely beautiful finish for interior walls. One method of obtaining concrete ashlar finish for inside walls is to line 8-inch concrete masonry walls with ashlar units or slabs of uniform thickness. In this way two walls are built which adds to the insulation.

The Partitions Interior partitions also are built with concrete masonry units. Those which do not carry a load from the floor or roof above are made 4 inches thick. Load-bearing partitions are made 8 inches thick. Plaster is applied directly to concrete masonry partitions.

The Second Floor After the concrete masonry walls are built up to the second floor level, one sees the second floor installed as he watches a home grow from footings to top of the roof. In the fireproof home being built, reinforced concrete is used for the second floor.

The floor may be built as a duplicate of the first floor or, if desired, a different method of construction may be used. A conventional flat plaster ceiling is obtained with any one of the three types of floors shown on page 6. With the precast joist or ribbed types, metal channels and small mesh metal reinforcement are attached to tie wires embedded in the concrete. Plaster is applied directly to the metal reinforcement. When the solid slab floor is used, plaster may be applied directly to the flat under surface of the concrete.

An Economical Method It is more economical, of course, to decorate the joists and slab of the precast joist and ribbed floors, as shown in the center photograph, instead of using plaster.

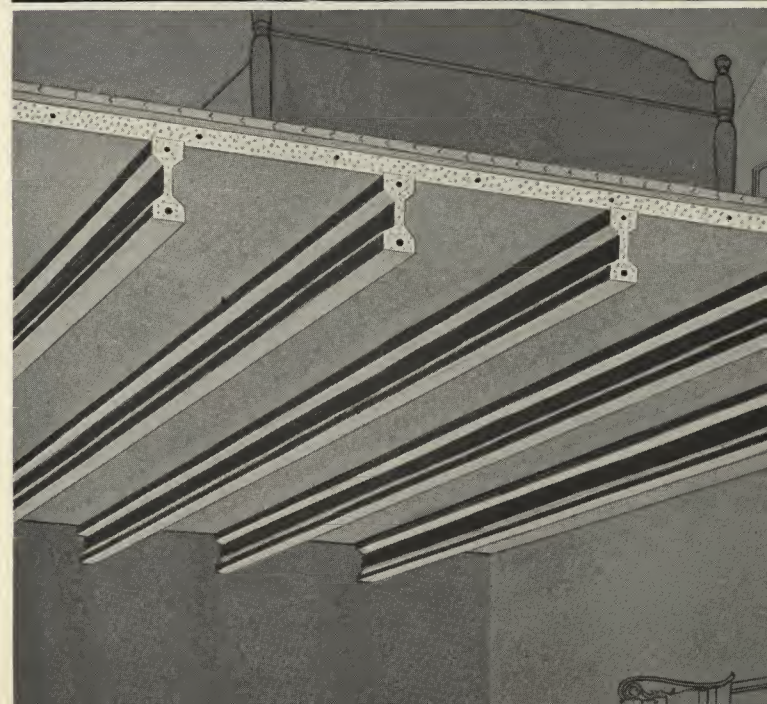
Many people will prefer a painted joist ceiling. It is a simple matter to obtain contrasting color effects between the joists and the slab, and this treatment helps to enliven the scheme of decoration. Any color or combination of colors may be used. Stencil treatments are frequently employed.

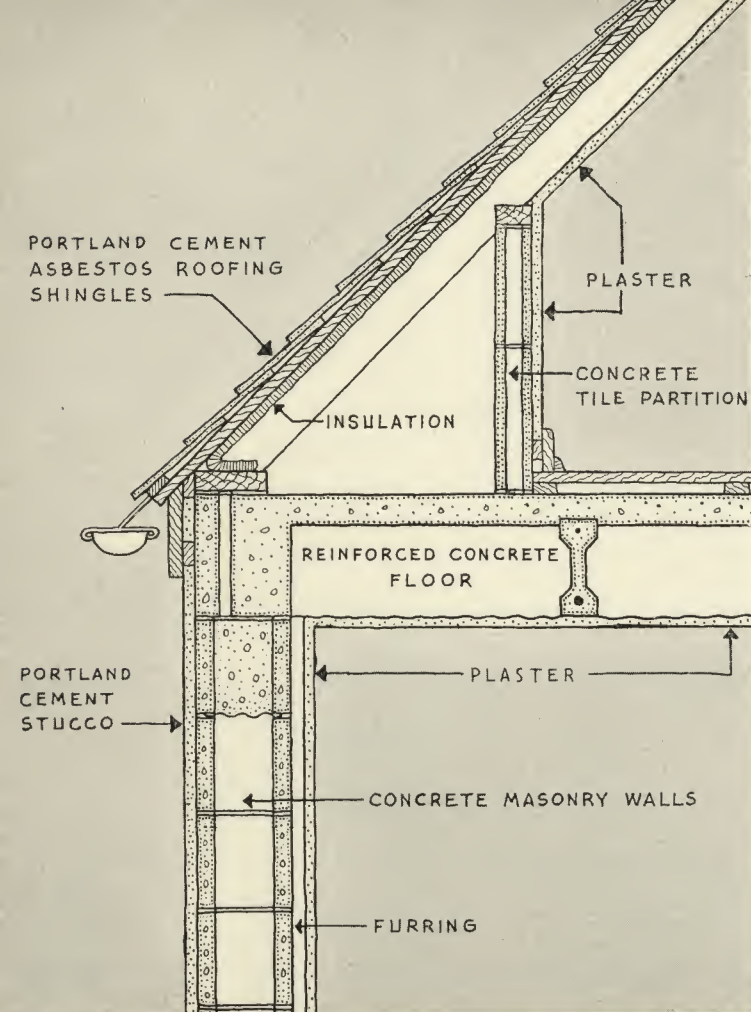
In the upper cut-out sketch on this page, a ribbed concrete structural floor is shown installed as a second floor. A plastered ceiling is included, the plaster being applied to metal reinforcement fastened to the joists.

In the lower cut-out sketch, a precast concrete joist floor is shown. This is one of the most economical treatments obtainable, and the joists may be decorated or left plain.

Second Floor Walls After the second floor is built, concrete masonry is laid for the second-story walls, following the same methods used for the first story.

So far, as one watches this home growing from footings to top of the roof, nothing but





fireproof materials have been used for the important structural elements of the house, and this is the reason why concrete also is specified for the attic floor and for the roof.

The Attic Floor It is entirely practicable to make the attic floor of reinforced concrete, because this construction adds greatly to the fireproofness of the home. This floor is constructed in the same manner as the second floor except that no finish is needed on top of the smooth-troweled concrete. If desired, however, wood flooring may be placed over the concrete structural floor.

The Roof As shown in the upper sketch on this page, the pitched roof is framed and sheathed with wood. However, it is covered with concrete for fireproofing, this consisting of portland cement plaster applied to small mesh metal reinforcement. Study the cross-sectional drawing. Notice that the walls, the attic floor and the under side of the pitched roof cannot burn because each is built with a non-burnable material—concrete. This construction builds out fires which originate within the home. To build out those of exterior origin, concrete materials are used for roof covering.

The Roof Covering Although cement-asbestos shingles, a fireproof covering, are chosen for the house being built, other concrete coverings may be installed. A close-up photograph—at the bottom of this page—shows a cement-asbestos shingle roof which has a slate-green color.

When the contractor builds a cement-asbestos shingle roof he first covers the roof sheathing with slater's felt. Then the shingles are nailed on top. Cement-asbestos shingles, which are available in nearly every community, are fireproof and incombustible. They also are long-lasting and economical.

Concrete roofing tile, which are factory-made products like cement-asbestos shingles, offer an alternate method of obtaining a fireproof roof covering. Tile are made in different colors, with reds and greens most popular.

As in building the cement-asbestos shingle roof, the contractor first covers the sheathing with slater's felt. Then narrow wood strips are nailed horizontally on top of the felt, after which the concrete tile are fastened to the wood strips. This method of construction provides an insulating air space between the tile and sheathing. A finished roof of concrete roofing tile is illustrated at the top of this page.

The Roof Terrace Within recent years modern architecture has developed flat roofs which are utilized for terraces on which recreational pursuits may be followed. A roof terrace, for example, offers opportunities for lounging, sun-bathing and other outdoor recreation which one cannot enjoy with the conventional type of home.

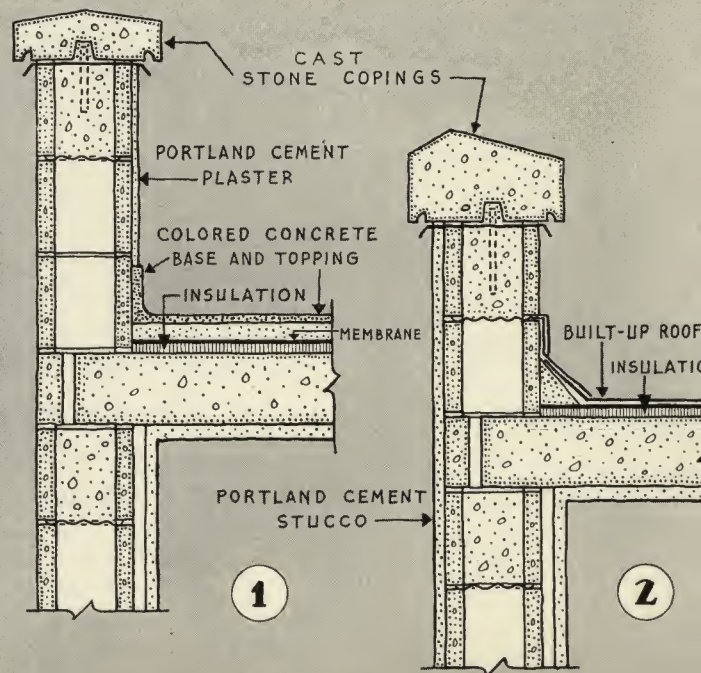
As illustrated in the center photograph on this page, concrete is ideal for construction of flat roofs and recreation terraces.

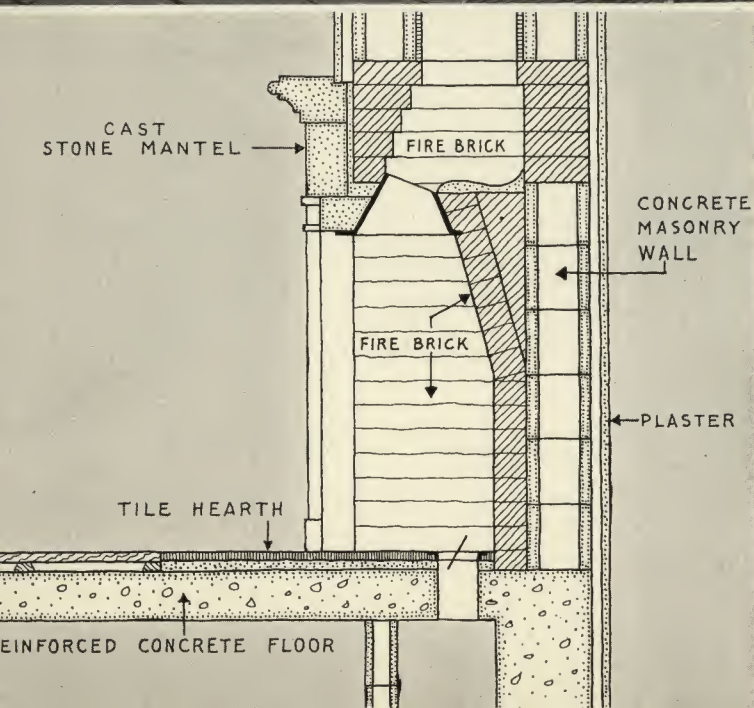
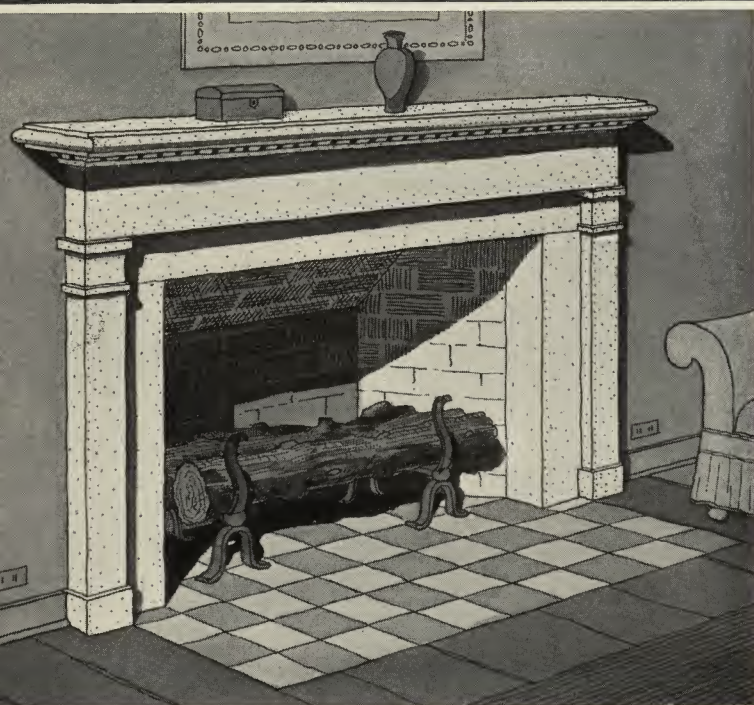
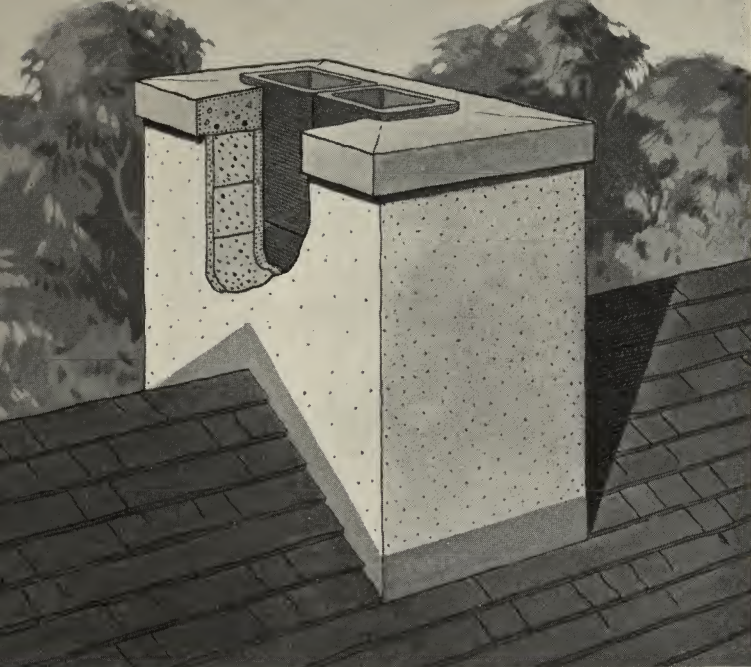
Construction Details Typical construction details for flat concrete roofs are shown in the sketches at the bottom of this page. In the first drawing (1), a concrete roof terrace is detailed.

The concrete masonry wall is carried a few feet above the roof level. This part of the masonry is known as a parapet wall, and is finished with a cast stone coping. The concrete roof slab is first covered with suitable insulating material that is protected on top with a membrane of waterproof asphalt. On top of this is placed a topping of quality concrete, or concrete floor tile are laid.

In the right-hand drawing (2), construction of a concrete roof, which will not be used as a terrace, is shown. Details of this construction are quite similar to those shown in the first drawing, except that the insulation is covered with built-up roofing instead of concrete.

Parapet walls usually are made about two feet high (three courses of 8-inch concrete masonry units), when the flat roof is to be used as a recreation terrace. On other flat roofs, a somewhat lower parapet wall can be built. As suggested in the drawing (2), two





courses of concrete masonry will give sufficient height. With roof construction completed, the next consideration is the chimney. Facts about chimneys and fireplaces are given here.

The Chimney After seeing a fireproof concrete home grow from footings to top of the roof, one is naturally concerned with other details of construction such as the chimney and the fireplace.

Building a fire-safe chimney is an important consideration. Therefore, concrete chimney block or concrete masonry units and approved flue lining are recommended. To complete the chimney, a concrete chimney cap is placed on top. The sketch at the top of this page shows the principal construction details.

Where the chimney and roof meet, as shown in the sketch, it is necessary to install flashing of non-corrodible metal. This helps to keep out rain and snow. The sketch also shows that chimney block are made with solid concrete. If concrete masonry units are used for this purpose, it is necessary to fill the core spaces with concrete as each course is laid.

When portland cement stucco finish is chosen for the exterior of the home, this same material is used to finish the chimney.

The Fireplace Usually one likes to exercise his individual taste in choosing a fireplace design, so the sketch in the center of this page is offered merely as a suggested design. Other types of concrete fireplaces and mantels may be obtained.

The concrete mantel shown in this sketch is made in one piece, is reinforced, and is smoothly ground on top and polished.

At the bottom of this page is a sectional drawing showing the principal details of fireplace construction. The fireplace is shown in relation to the concrete masonry wall of the home and the reinforced concrete floor.

All fireplace designs call for an approved lining of fire brick, as shown in the sketch.

There are several alternate methods of building the hearth. As illustrated, the hearth may be built with concrete floor tile laid in

portland cement mortar. Or, if desired, the hearth may be built with colored concrete that is marked off into an attractive pattern.

The Stairs To add fireproofness to the home, it is important to build stairs with a fire-resistant material. Reinforced concrete is well suited for this purpose.

Basement stairs are illustrated in the sketch at the top of this page. Stairs from the first to the second floor will be similarly built. However, for the home being built, figuratively, in this booklet, it will be desirable to color the treads and risers.

If desired, concrete stairs may be covered with carpet or colored tile treads.

The Playroom Until recently the basement was scarcely more than just a place for the coal and furnace. But today basement space is valued more highly. People now appreciate that basements may be used for recreational purposes.

Illustrated in the center of this page is a modern recreation room. It is built in a basement. Notice the walls, which are finished with a veneer of concrete ashlar, and the portland cement stucco finish for the ceiling.

In this recreation room the family may gather to play cards, listen to the radio, or the children may romp and play without disturbing those in rooms above. Colored concrete or concrete tile may be used to finish the floor.

The Workshop When there is extra space in the basement, this may be utilized as a workshop so that the home owner can have facilities for tinkering.

In the workshop illustrated at the bottom of this page, the walls are concrete masonry, the basement floor is concrete, and the first floor—which forms the basement ceiling—is reinforced concrete.

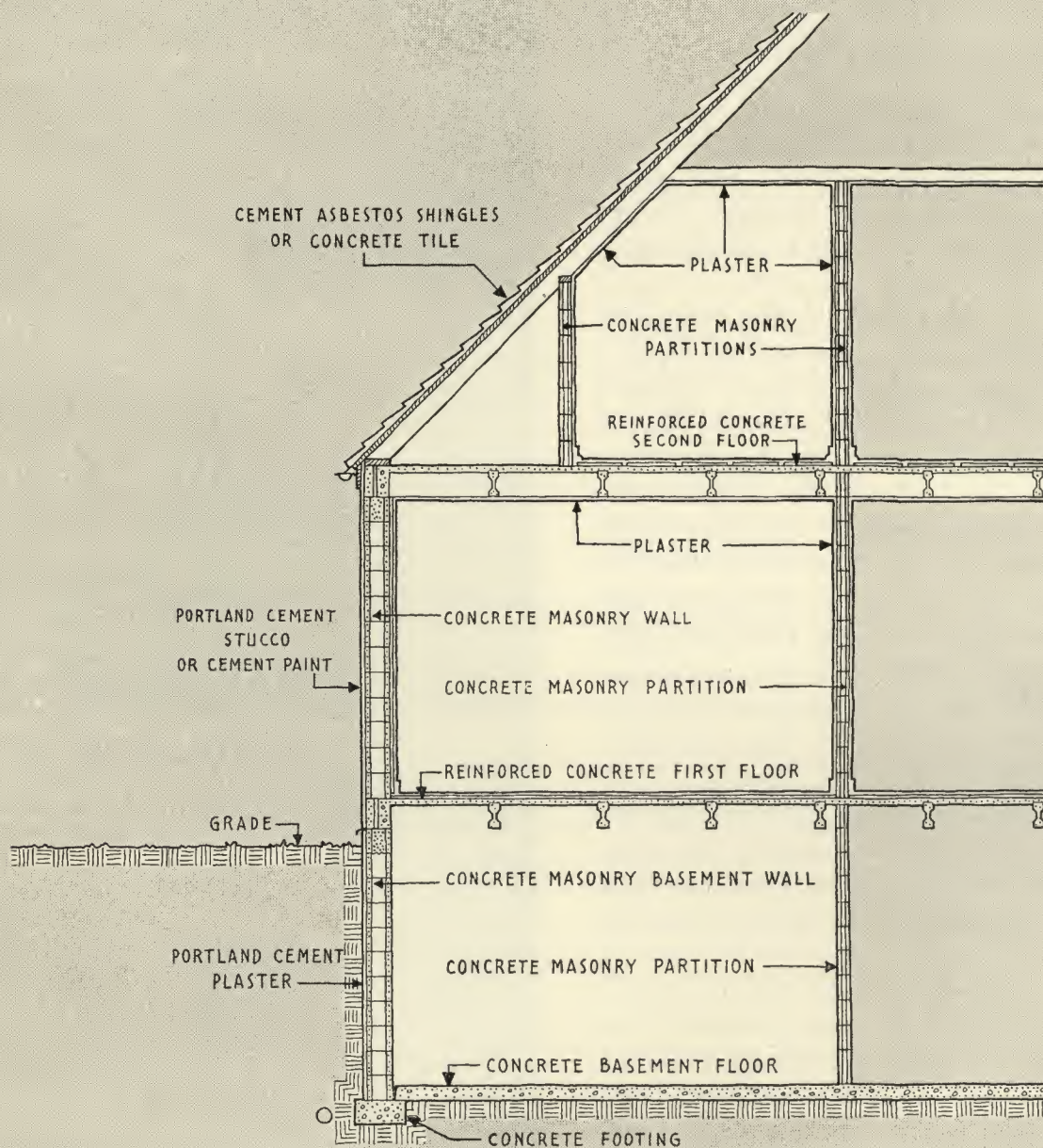
Turn to page 16 for a summary of the construction work which has been completed in the home you have been watching grow from footings to the top of the roof. And then turn to pages 18 and 19 for concrete suggestions about making the home grounds beautiful.



Principal Details of the Concrete Home

THE cross-sectional drawing below shows the principal construction elements of the fireproof concrete home. Such a home is reasonable in first cost and extremely economical over a period of years due to the low—the practically negligible—maintenance cost. Instead of showing signs of depreciation in five or ten years, as cheaply constructed homes do,

this concrete home will give excellent service for many times that many years, and with practically no upkeep expense. It cannot rot, sag or warp, or burn. It is free from the attacks of vermin and termites. It exemplifies the best and most economical in home construction. It is the reason why *it pays to own a fireproof home.*



MODERN HOMES

The modern home of fireproof concrete is an architectural and structural achievement. Study the five homes pictured on this page. Each is built to last for years and years. Each offers a different architectural treatment, showing that—with fireproof concrete—a wide variety of designs is available.

Below is a modern home built recently in Omaha, Nebraska, by the Junior Chamber of Commerce. It is modern in design; modern in construction, the walls being of concrete masonry finished with portland cement stucco; the floors being built with precast concrete joists. It is called the "House of Tomorrow." R. F. Hennig, architect, designed it.



This attractive residence is the home of Clarence E. Day, architect, who designed it. Walls are of concrete ashlar painted white.



In the South, Southwest and on the Pacific Coast, this type of concrete home is popular. It might be said to be of modified Mexican design. Walls are of monolithic (solid) concrete; roof is covered with fire-resistant tile.



For those who prefer a more conventional design, this concrete masonry and portland cement stucco residence will have an immediate appeal. The house is small, being of the low-cost type. Built of concrete, it is fireproof and will likewise resist the effects of time and weather. Plans were prepared by the Architects' Small House Service Bureau, Inc.

The California house shown at the right is an achievement in modern design which interests many home owners. Designed by Douglas Honnold, architect, this home is built with monolithic concrete walls which are finished with white portland cement stucco.





Making the Home Grounds Beautiful

NOW that the fireproof concrete home has grown from footings to top of the roof, as described on the preceding pages, attention is directed to its surroundings. Landscaping and home improvements may be completed with that versatile material—concrete—with which the home itself is built.

Because its plastic properties permit it to be molded into any shape desired, concrete is especially suitable for constructing various improvements. For example, the home may be made into a small estate complete with its gardens, fountains and pools. These improvements may be undertaken step by step as time and finances permit. They represent investments which directly increase the value of the home and, at the same time, afford the owner considerable enjoyment.

The Terrace Among the relatively new improvements for the home grounds is the terrace which is paved with plain or colored concrete flagstones. (See photograph at top of this page.) The flagstones may be set in portland cement mortar (colored or plain, depending upon the treatment desired) on a concrete base, or they may be embedded in the earth. When the latter method is used, grass is allowed to grow between the flagstones.

A terrace paved with concrete flagstones provides a restful place for lounging and reading on sunny summer afternoons or in the early summer evenings. Many people call terraces "outdoor living rooms" and utilize these areas for garden parties.

Walks and Drives Today's home builders are paying more and more attention to the walks and drive-ways which serve their places of residence. While it is both practicable and economical to build these facilities with plain concrete, present-day construction methods and coloring

materials bring colored concrete within the reach of all. Accompanying photographs picture a walk and a drive which have been built with concrete of several colors in an irregular design. These pavements resemble flagging.

Other designs will suggest themselves to home owners who wish to incorporate color in concrete walks and drives.

Pools An attractive lily pool of concrete construction is illustrated at the top of this page. This is but one of the many designs from which home owners can choose a pool that will provide a spot of interest and enjoyment in the home grounds.

Experienced concrete contractors are ready to build attractive lily pools of any shape, size or color, and the cost of such a pool is surprisingly low. A home owner who is adept at construction work often will build his own pool.

Gardens There are countless other concrete improvements for the home grounds which are available from manufacturers of concrete garden furniture or which can be built on the property by concrete contractors. A bird bath is one of the most popular of the former type. A typical bird bath is shown in the center photograph.

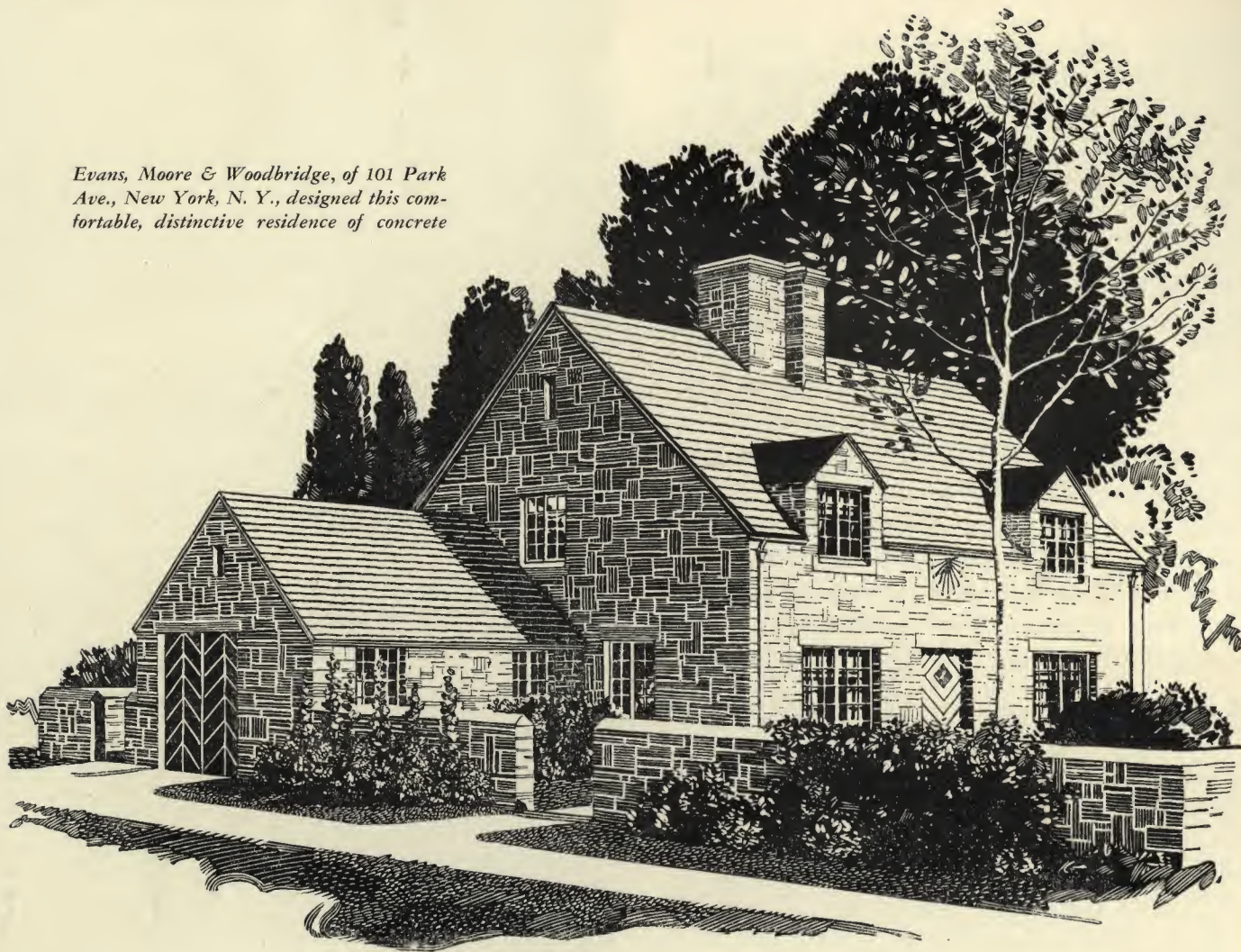
Wading Pools Another popular type of pool for the home grounds is the small wading pool in which children can cool off on hot summer days. A representative concrete wading pool, shallow enough to be safe at all times, is shown in the photograph at the bottom of this page.

And now the fireproof concrete home is finished. From the footings to the top of the roof, it is a modern structure, and the garden appointments add beauty and charm.

The Portland Cement Association has prepared this story, "It pays to own a fireproof home—Here's How It's Built with Concrete," to help the reader realize that the fireproof concrete home, which is available now, is an architectural and structural achievement worthy of consideration by the most exacting home buyer or builder.



Evans, Moore & Woodbridge, of 101 Park Ave., New York, N. Y., designed this comfortable, distinctive residence of concrete



*You'll be proud of your
home when it's built of*

CONCRETE ASHLAR

Whatever form your ideal home may take under your architect's pencil . . . whatever the shape, the size, the texture, the color, you decide upon . . . you can adapt it readily to enduring Concrete Ashlar.

Then you will have a fireproof home . . . a beautiful home . . . a home of real comfort in summer and winter . . . a home proof against dampness, and insect

pests, and decay . . . a home that will be salable, rentable, *livable*.

Ask your architect to show you the beauty-possibilities of time-defying Concrete Ashlar.

Our new folder, "Happy Living," shows a number of suggested patterns and colors in Concrete Ashlar. Write for your *free* copy.

P O R T L A N D C E M E N T A S S O C I A T I O N
A NATIONAL ORGANIZATION TO IMPROVE AND EXTEND THE USES OF CONCRETE
3 3 W E S T G R A N D A V E N U E . . . C H I C A G O